STEADY-STATE MEASUREMENT OF THERMAL CONDUCTIVITY OF CERAMICS AND CERAMIC COATINGS

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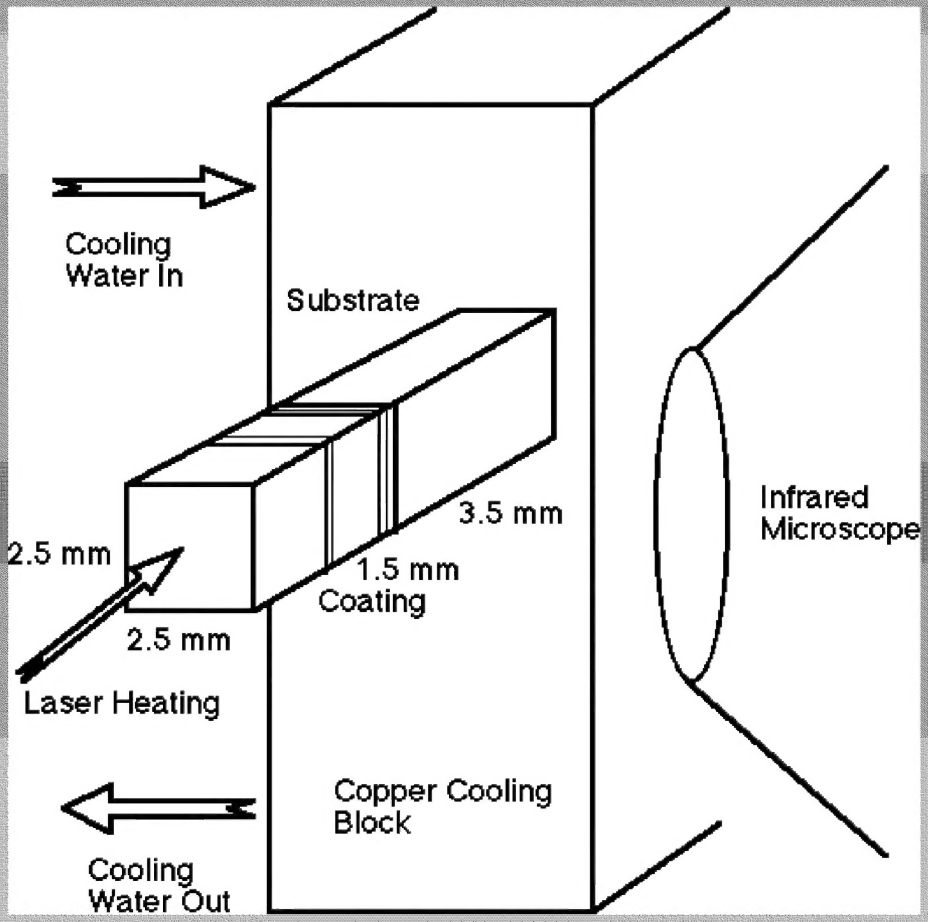
Discussion Points

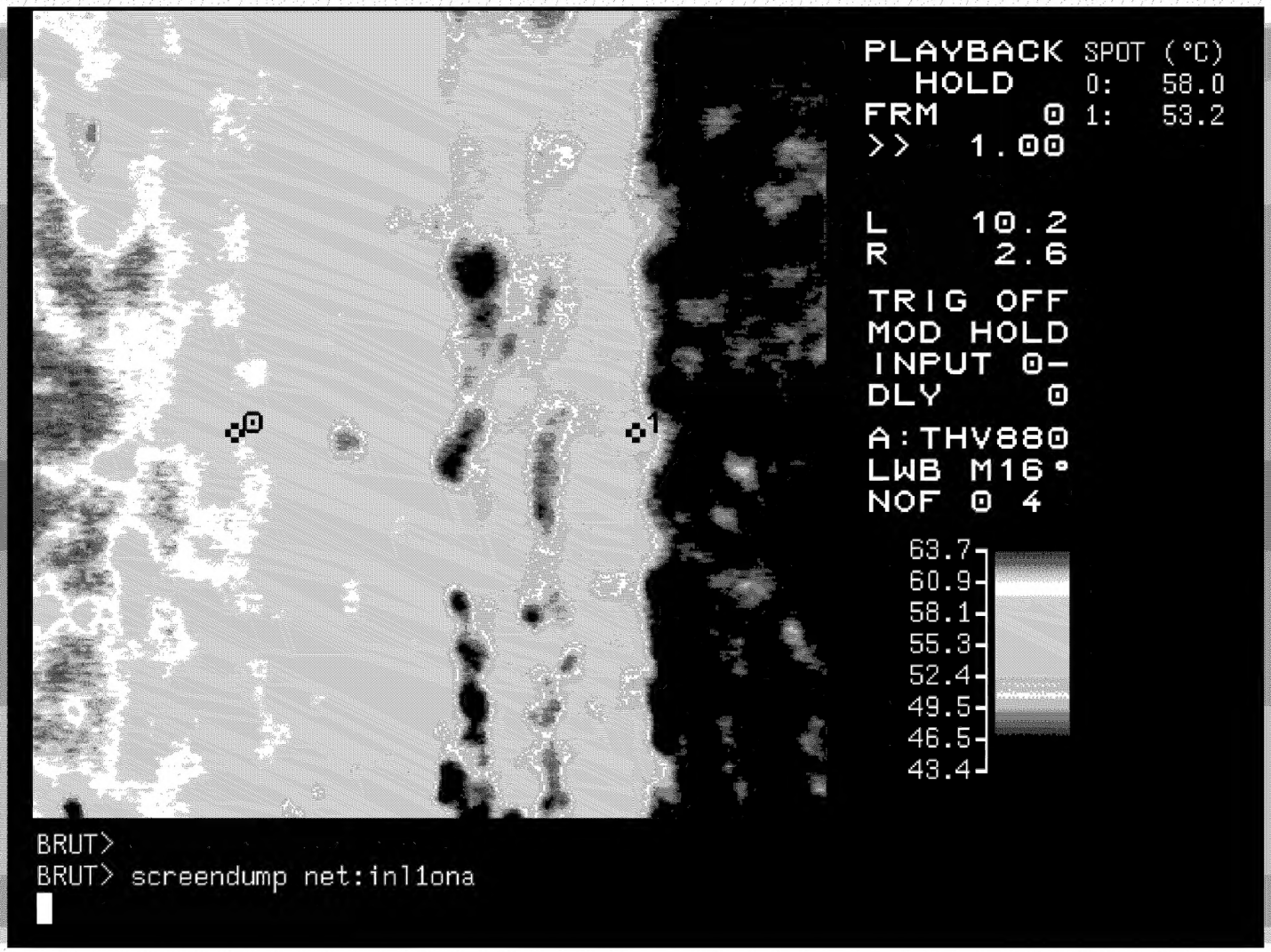
- Steady-State Measurement Method
- Validation
- EB-PVD $\rightarrow$ EB-DVD
- Future Direction (SPM)

Measurement using Infrared Microscopy

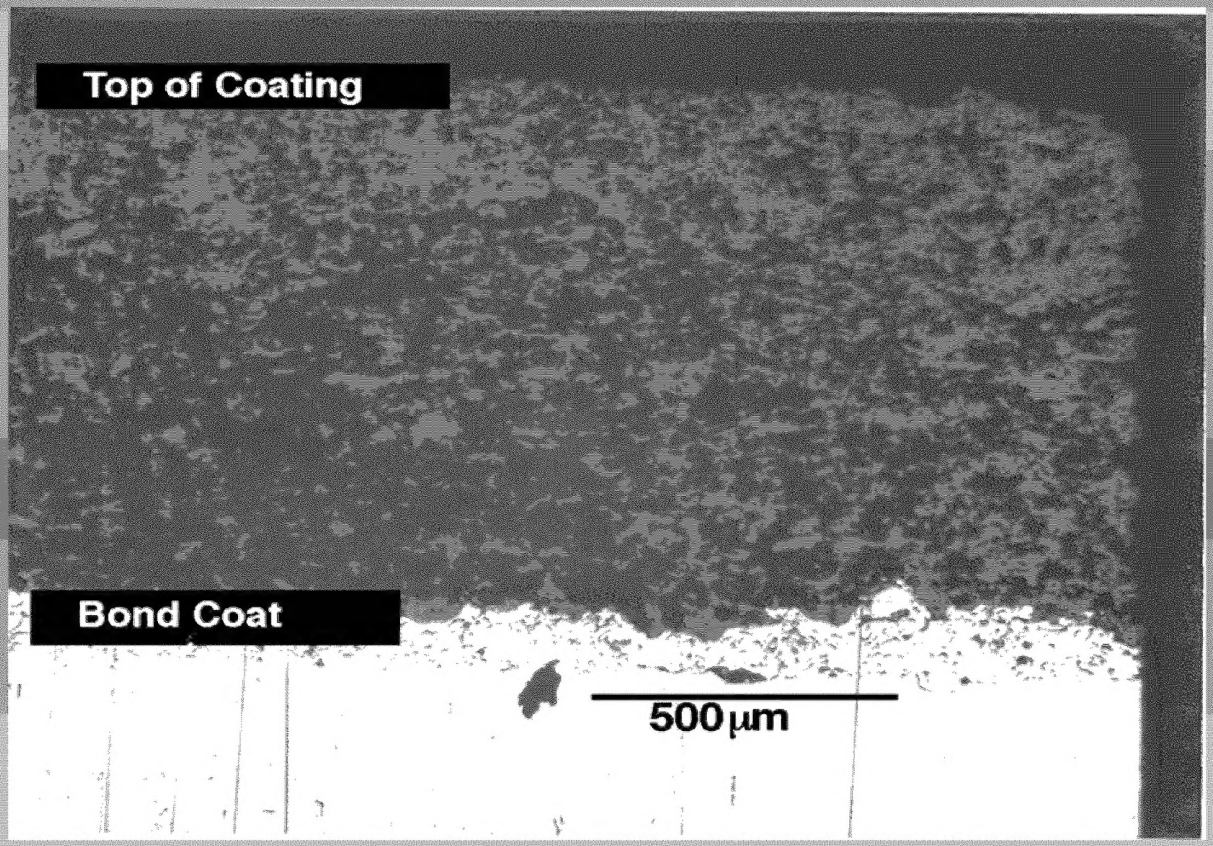


- 1.6 x 1.6 mm field-of-view
- 8 to 12 μm detection
- 10 μm spatial resolution
- Room temperature to 250 °C
- steady-state
- laser or Joule heating

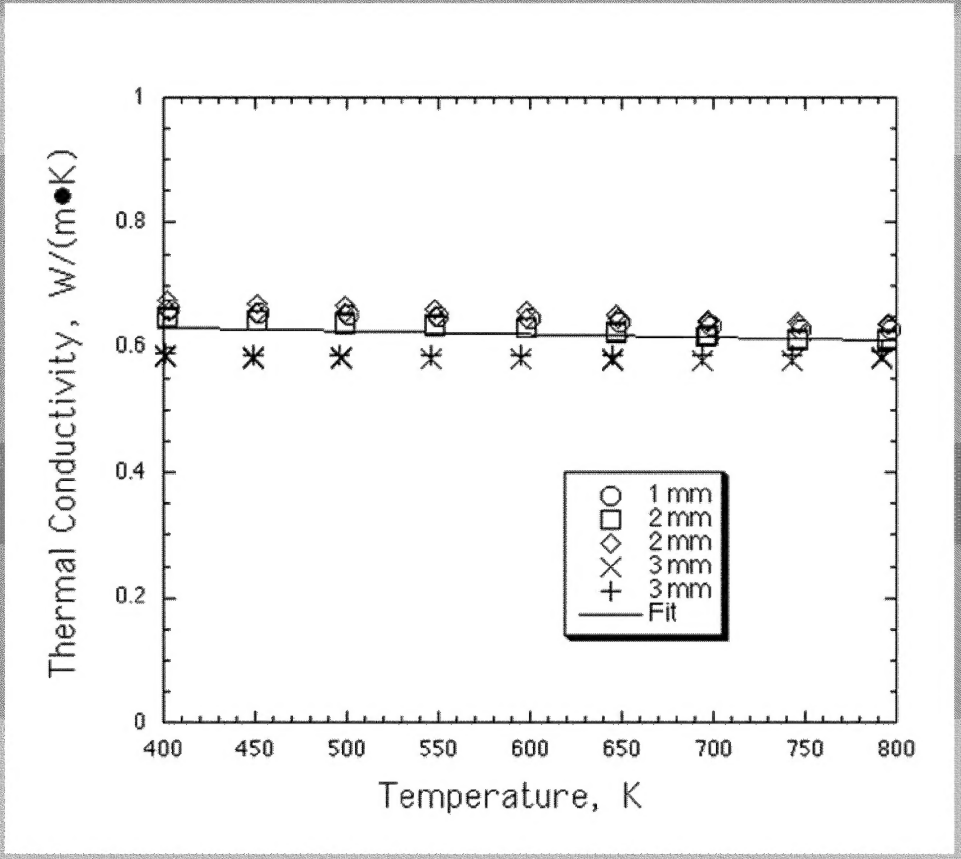
Infrared Micrograph of an Alumina-Nickel, 4-layer Functionally Graded Coating on a Nickel Substrate



Plasma-Sprayed 1.0 mm thick 8% Yttria-Stabilized Zirconia Coating with 0.1 mm thick NiCrAlY Bond Coat on 410 Stainless Steel

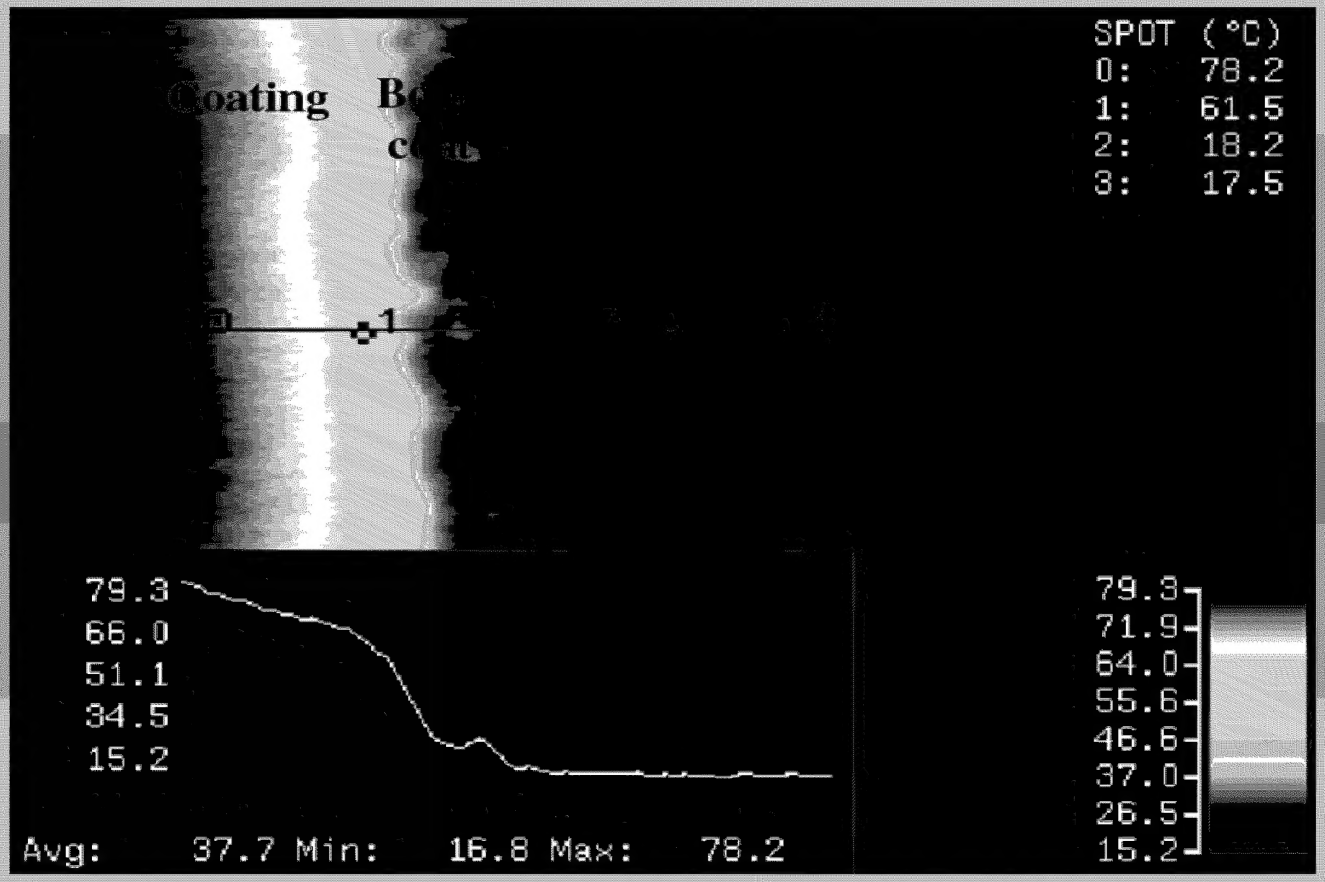


Results for an 8% Yttria-Stabilized-Zirconia Coating on 410 Stainless Steel

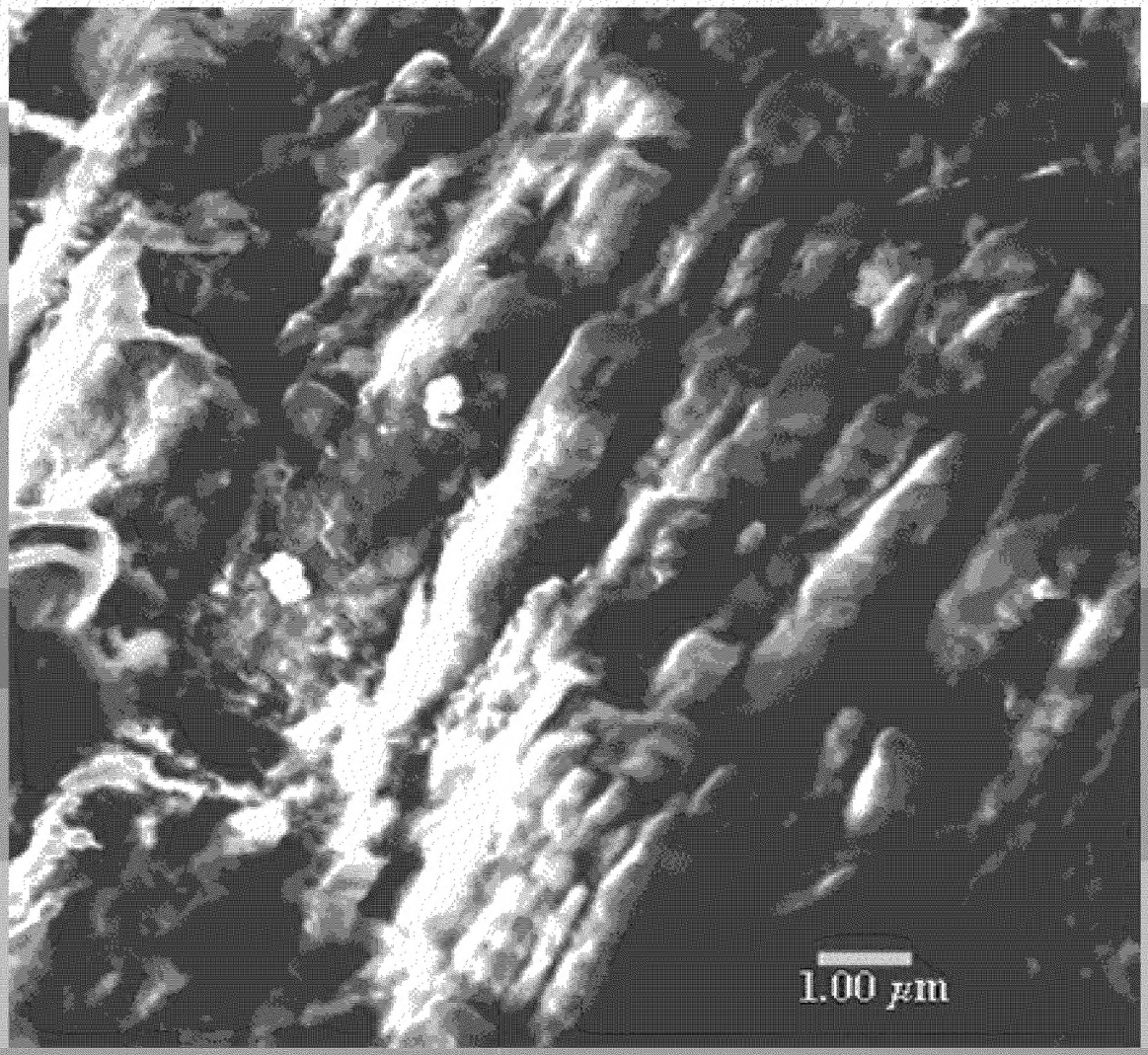


Infrared Microscope Image of a Plasma Sprayed 8%Yttria-Stabilized Zirconia Coating, 1.0 mm thick, on a 0.1 mm thick NiCrAlY Bond Coat on 410 SS

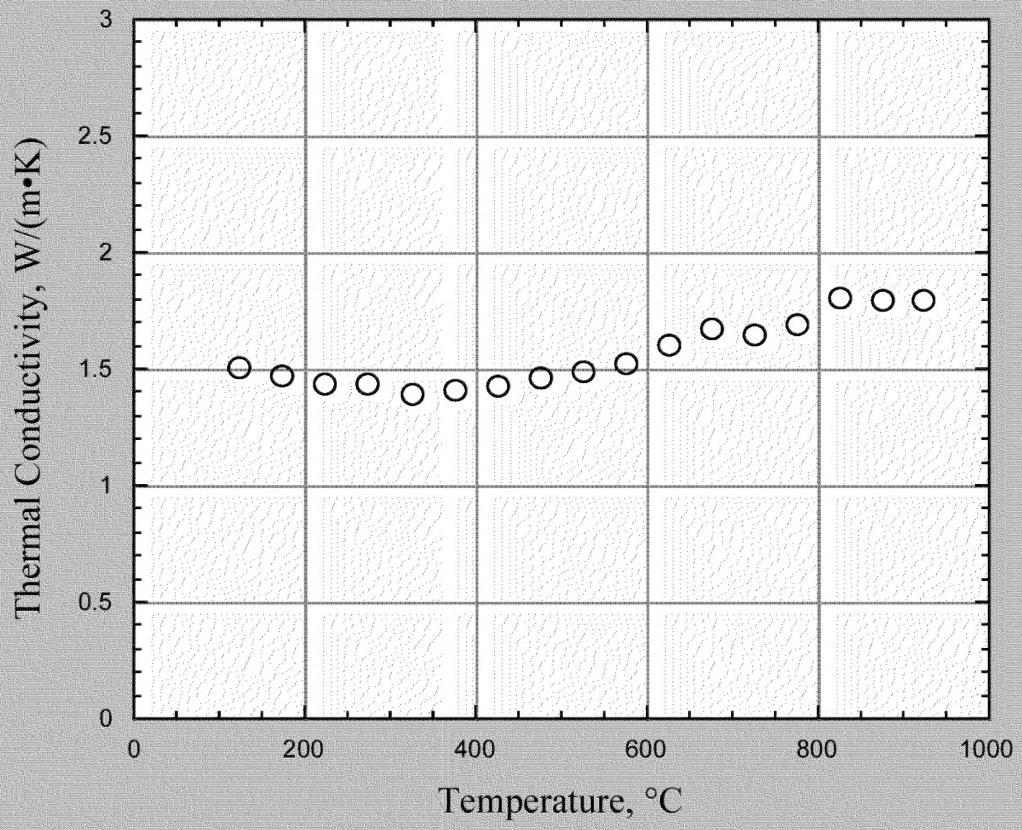
- Specific Interfacial Thermal Resistance 4.1 E-4 m2•K/W



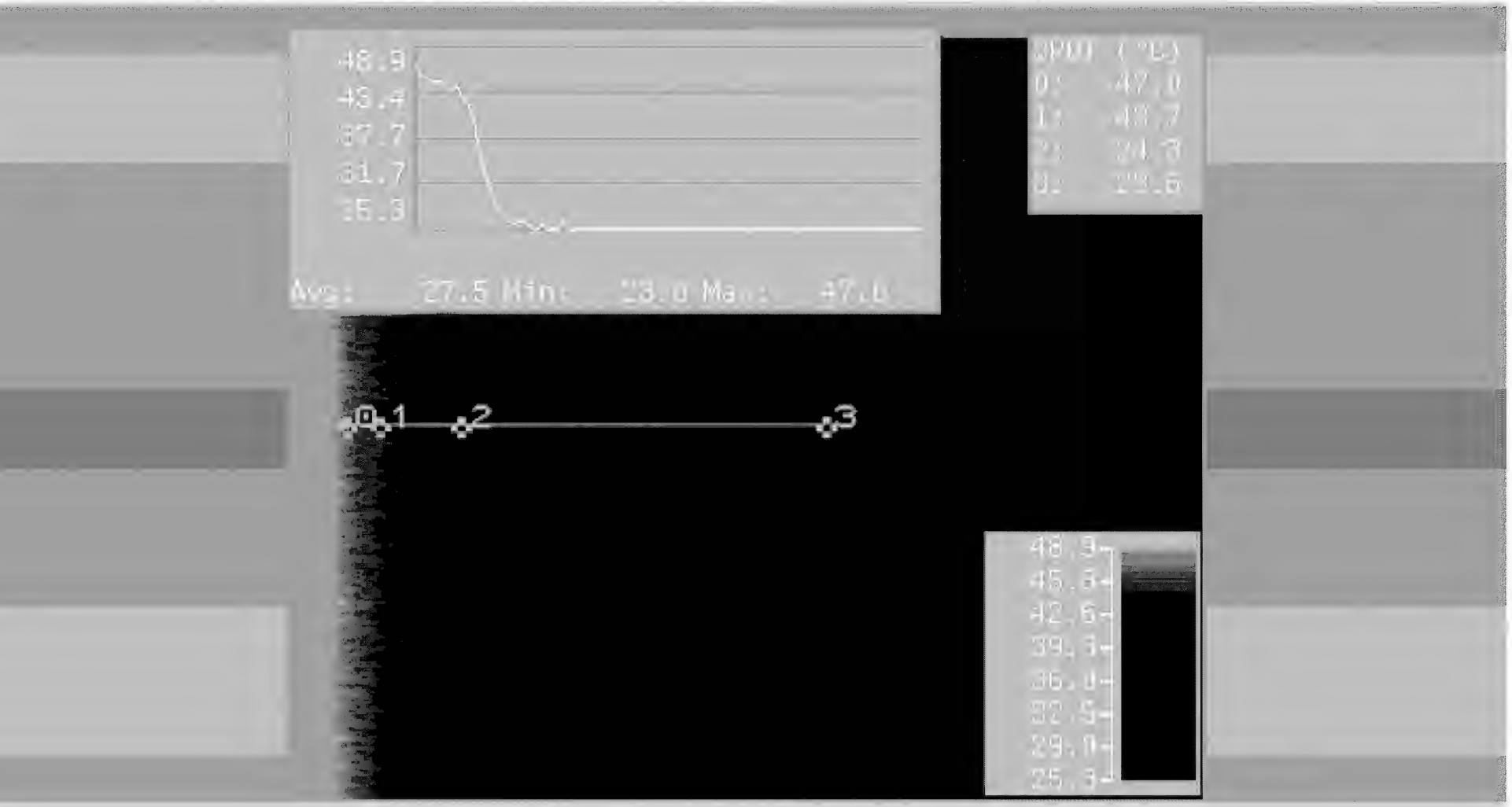
Microstructure of a 7% YSZ EBPVD Coating



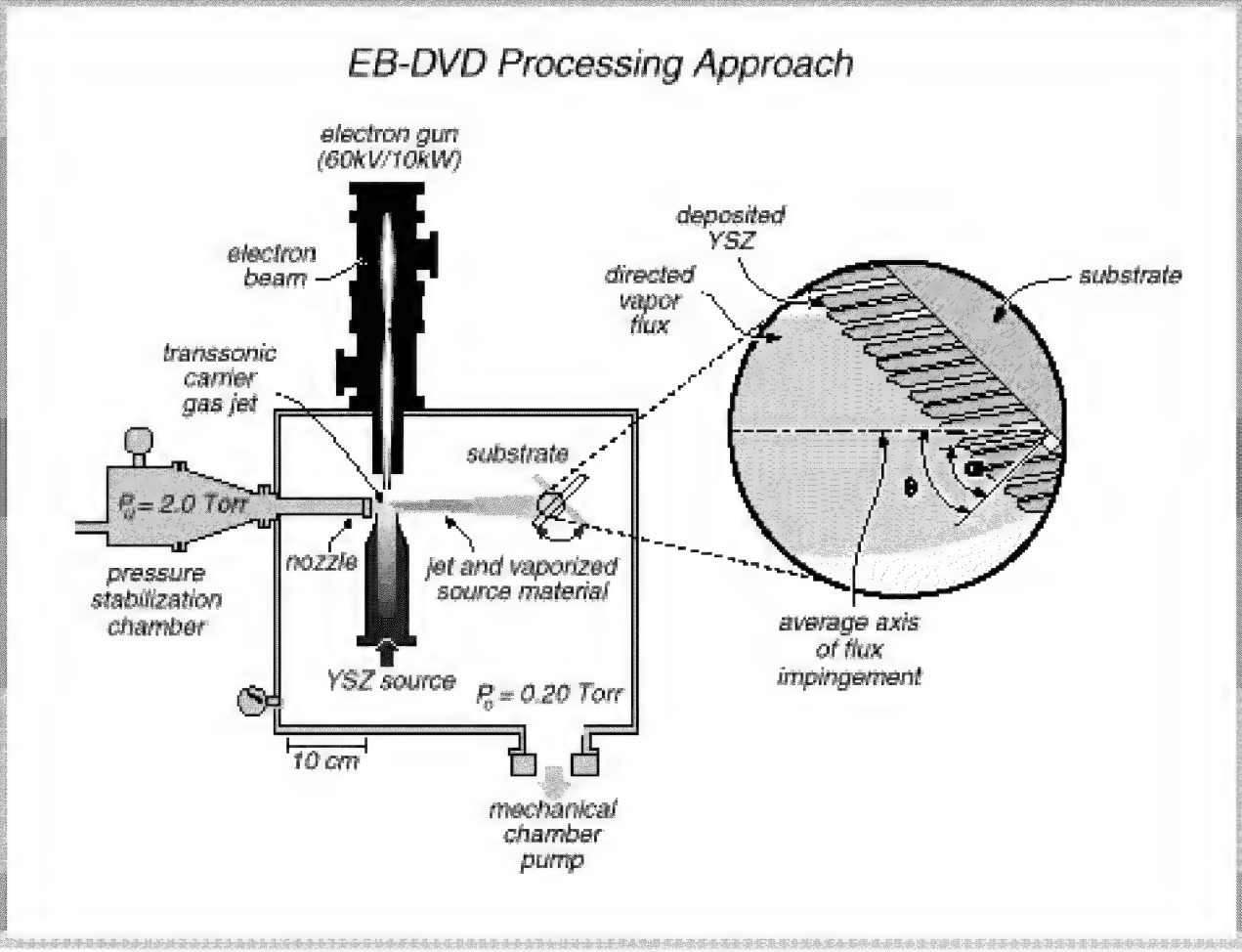
GHP Measurement of an EBPVD Coating from an Industrial Collaborator



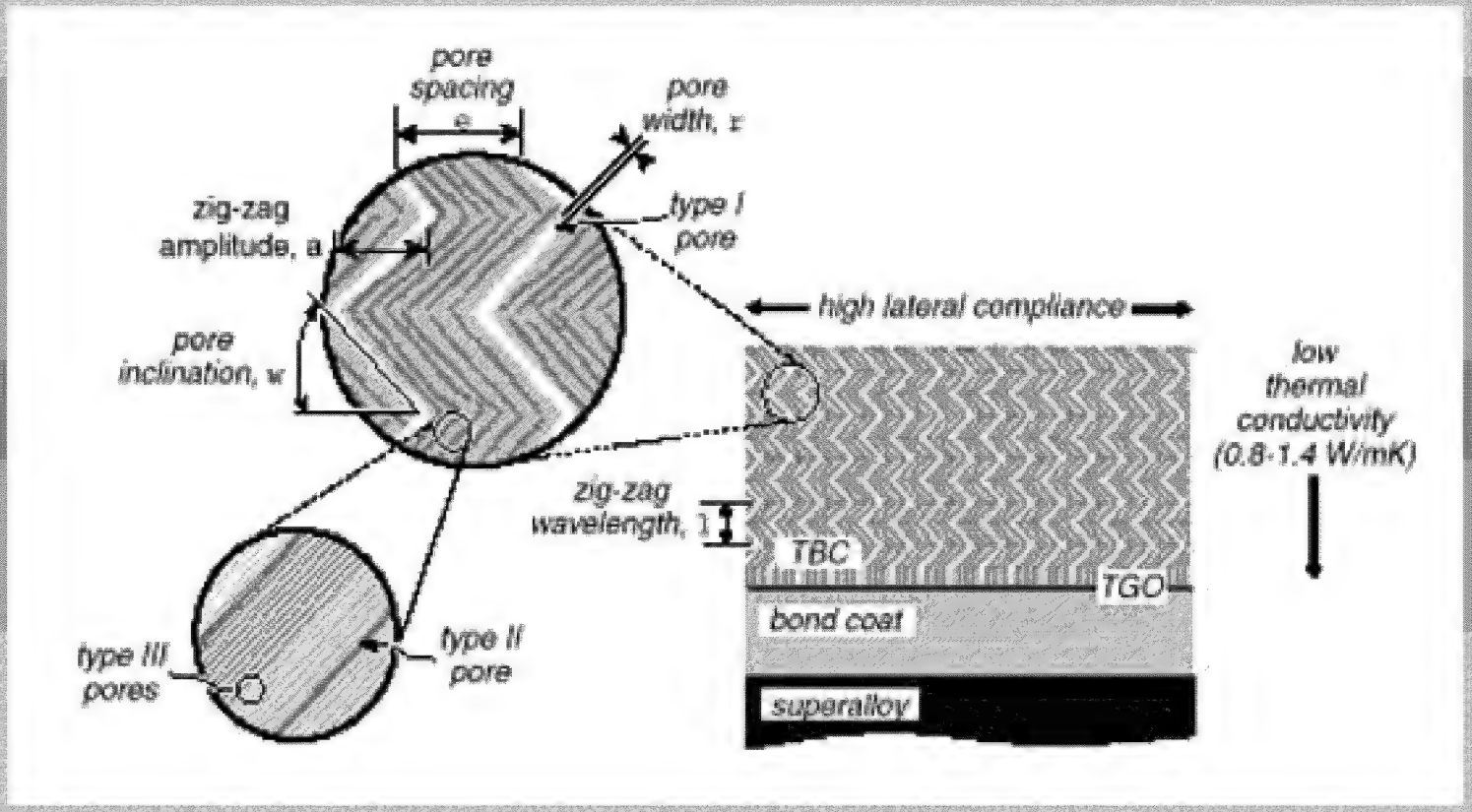
Infrared Image of an EBPVD Coating



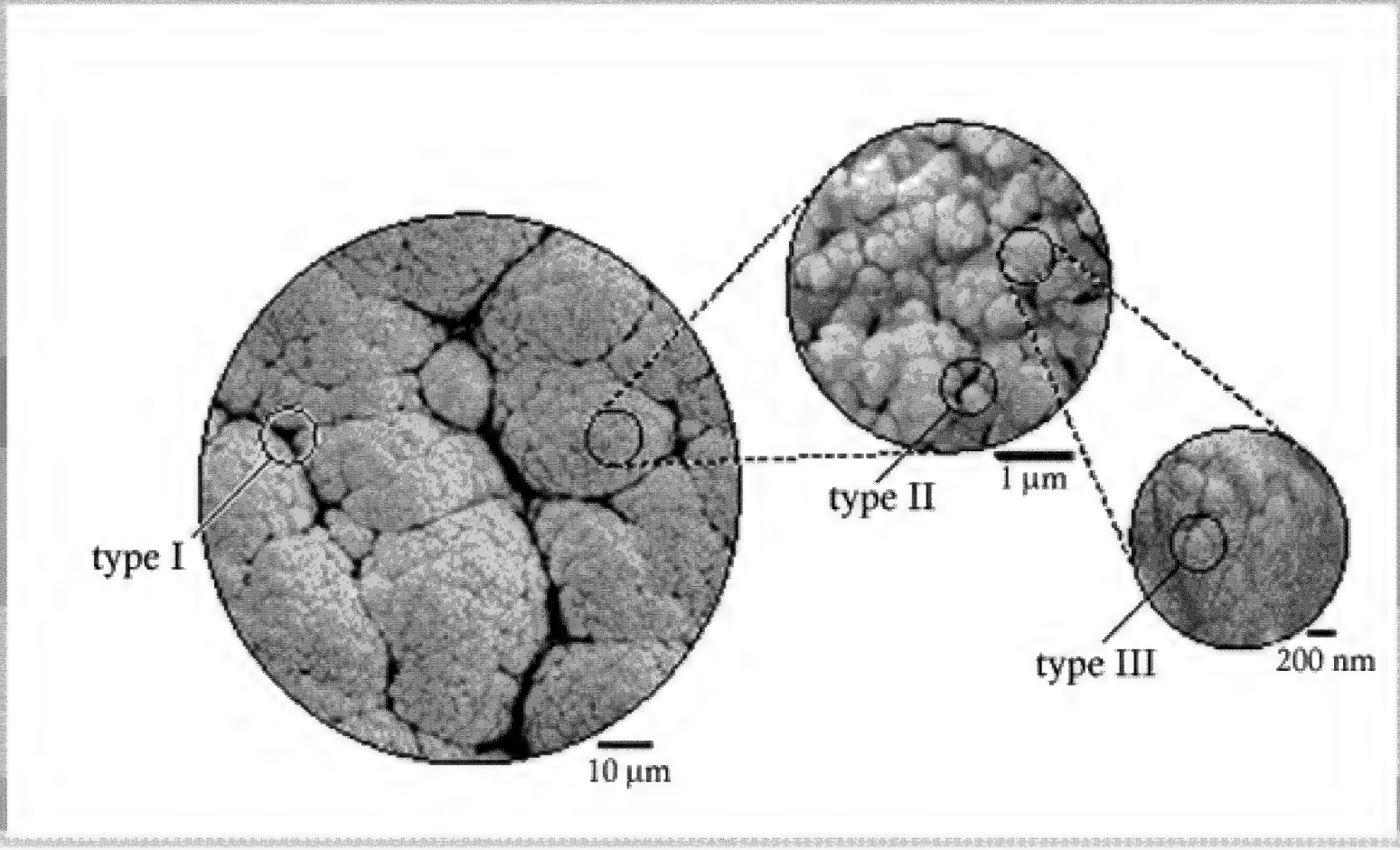
IR Microscopy of Coatings
EB-DVD method



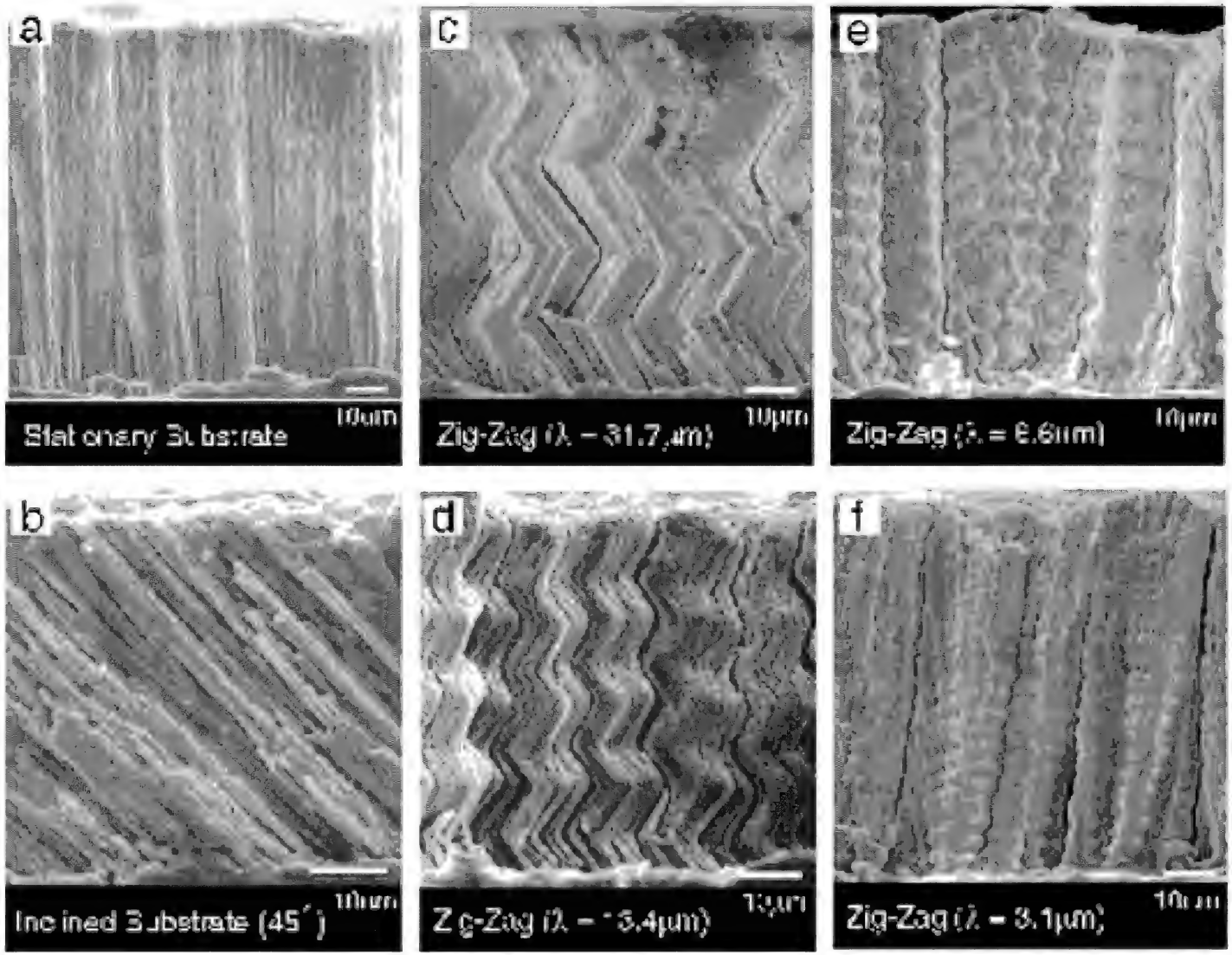
Zig-Zag Coatings



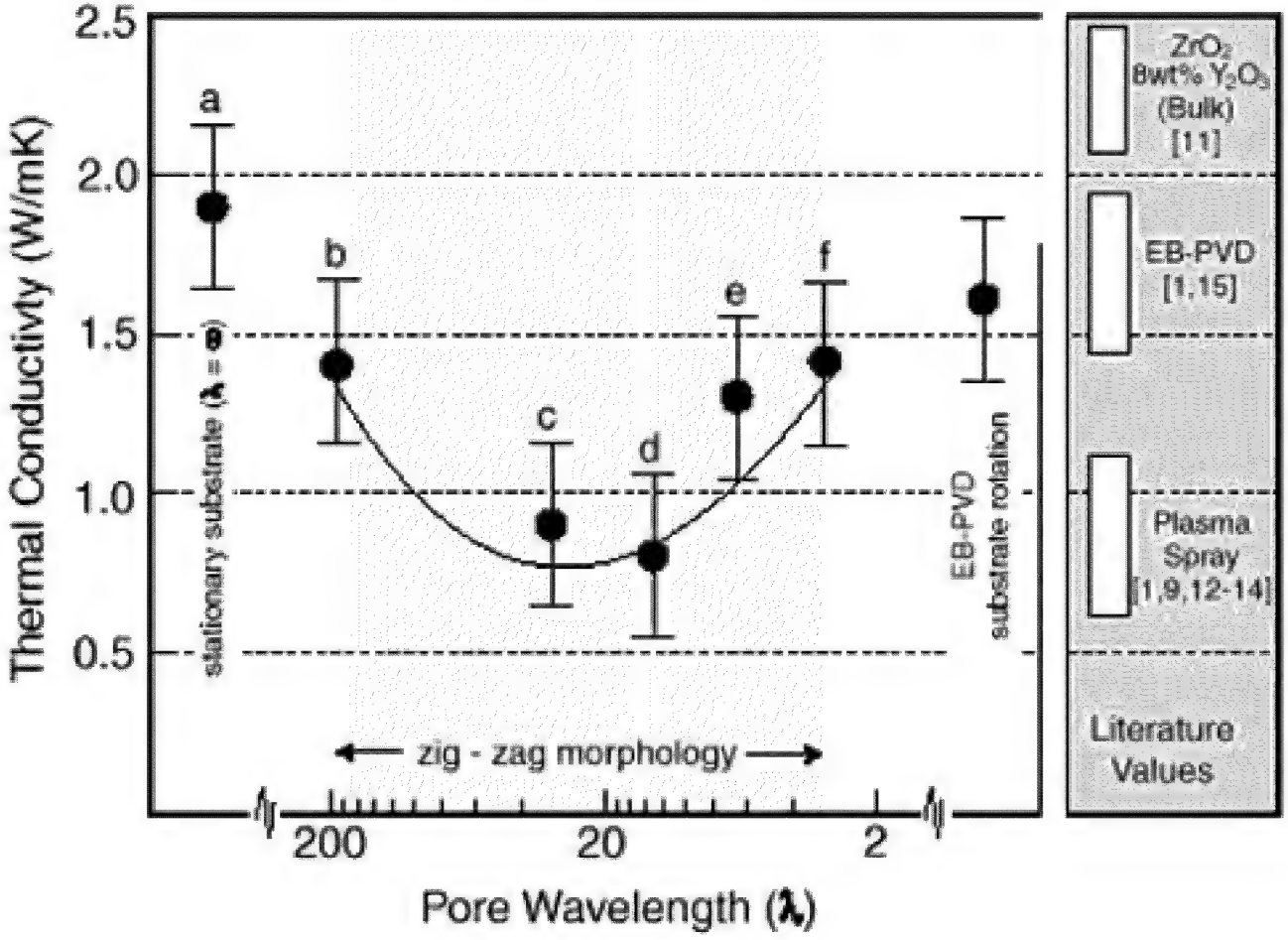
Pore Morphology



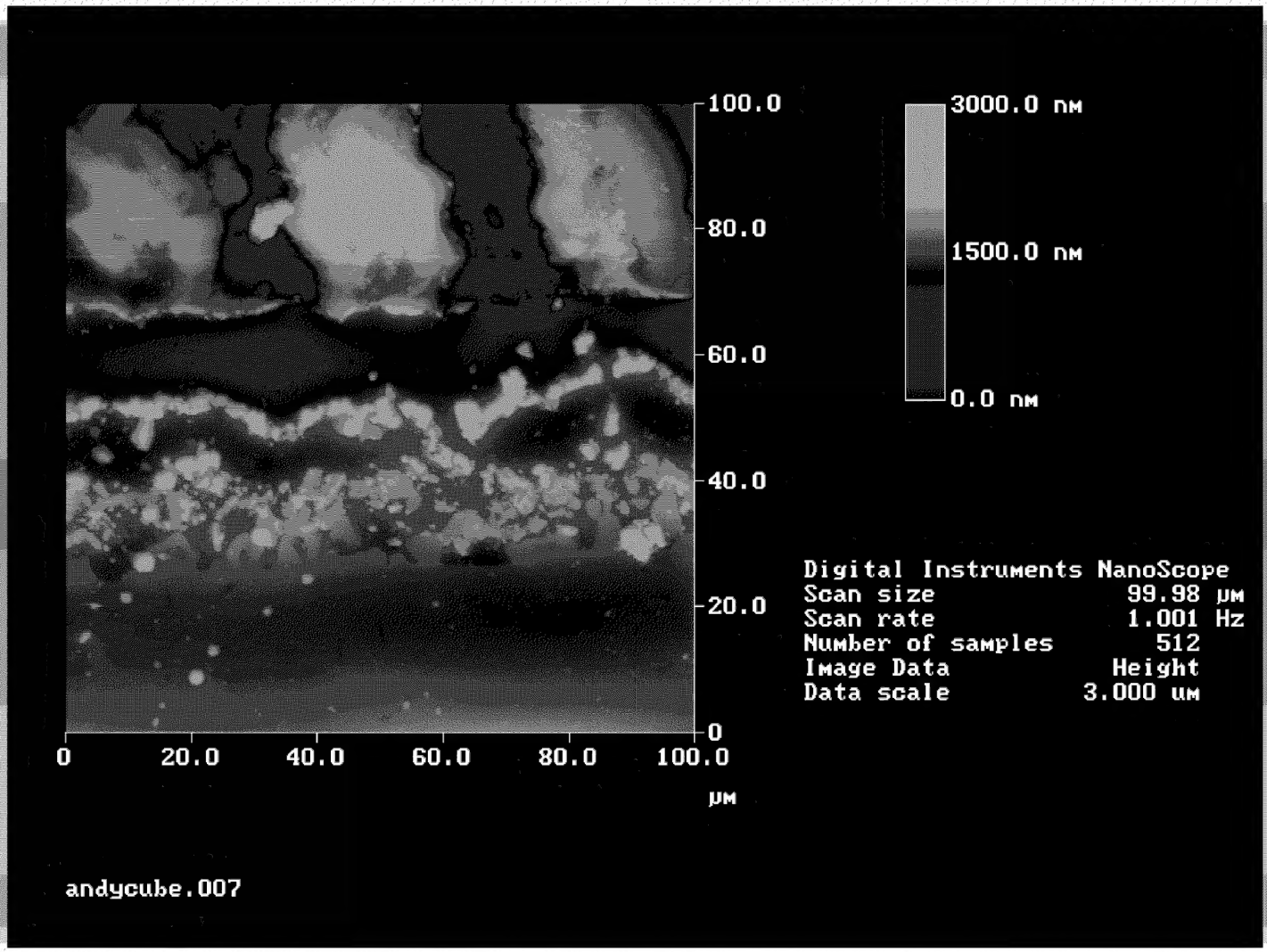
EB-DVD Coating Morphologies



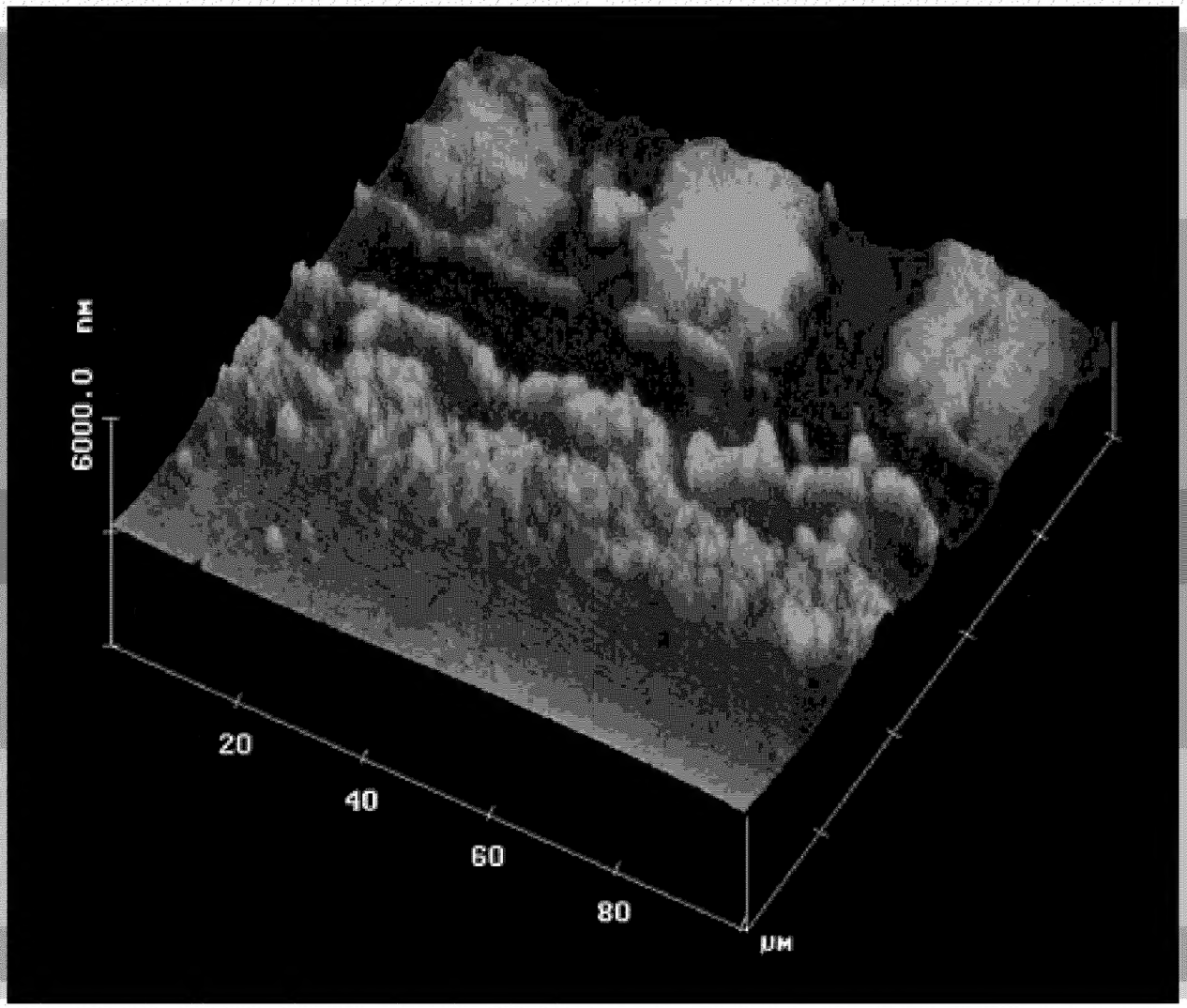
Coating Thermal Conductivity



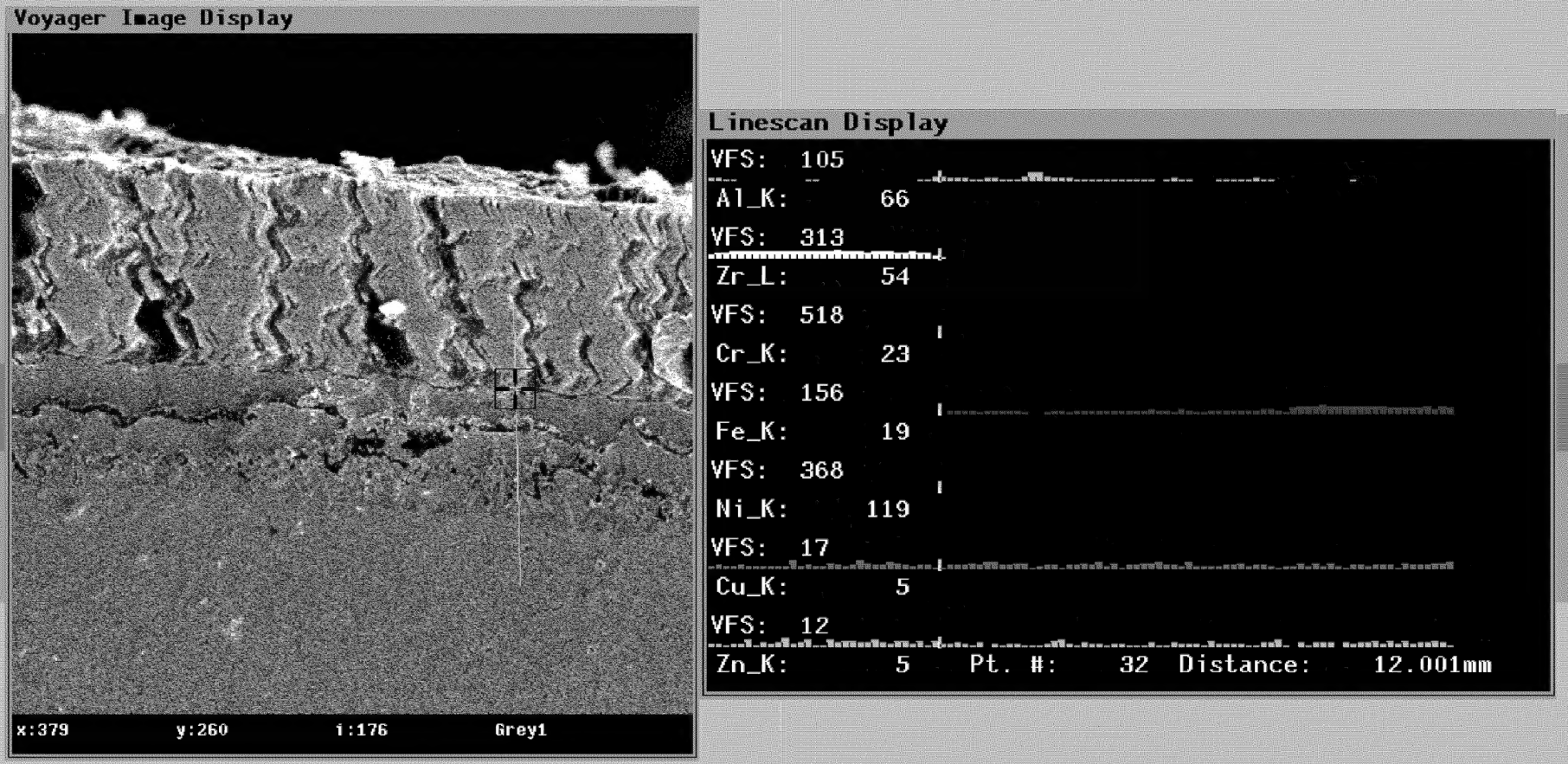
Scanned-probe microscopy



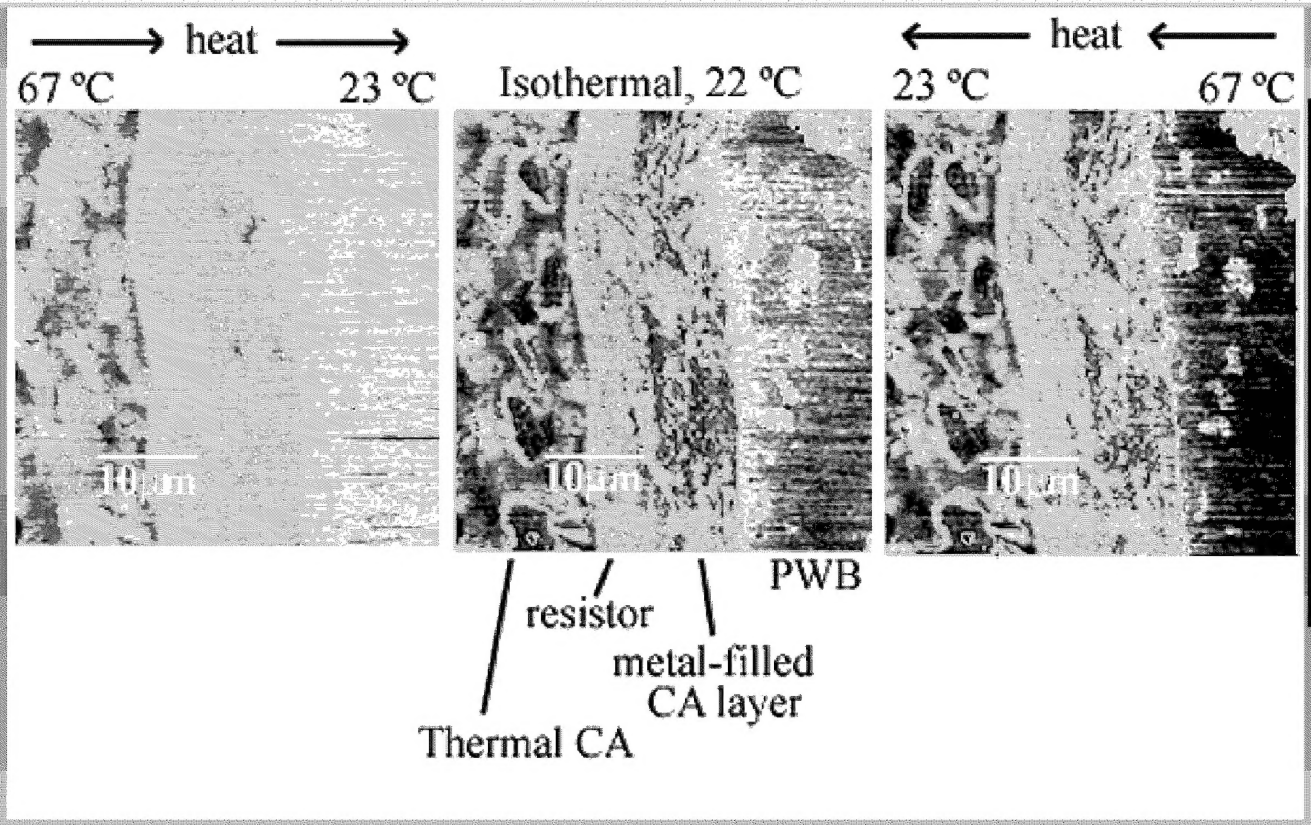
Polishing is an Issue

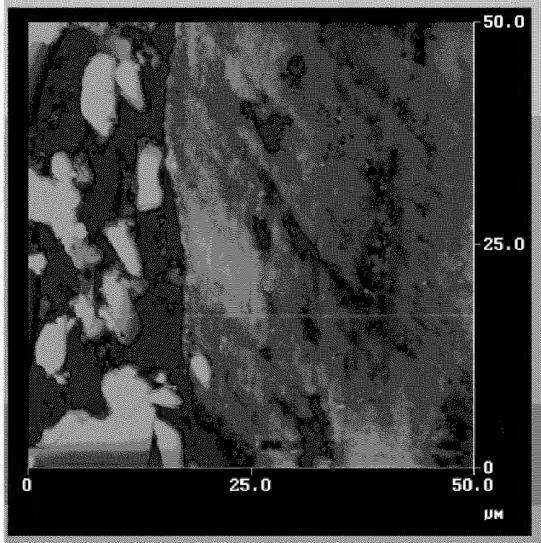


Analysis of the Layers



Thermal SPM





Topographic AFM